



# Urban Foresters Response to Climate Change in Canada



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## Abstract

Climate change is real and causing dramatic changes in ecological and social systems around the world (IPCC, 2011)[1]. Symptoms of climate change include intense storms, extreme temperatures, seasonal shifts, drought, and flooding. These changes have an effect on the urban forest. However, those managing our urban forests may or may not have experienced or responded to the impacts of climate change. Trees in the urban forest are vulnerable to the changing climate and may not be well adapted for new conditions. New conditions could include hotter and dryer summers, limiting the spring planting season and the species of trees that can be planted. In turn, urban foresters may have to adapt to these conditions and change how they plant and maintain the urban forest.

The purpose of this research is to determine whether urban foresters in Canada are responding to climate change, and if they are, how they're adapting to climate change. This research seeks to understand and analyze how knowledge and experience affect action in relation to climate change and the urban forest. A survey was created for urban foresters to fill out regarding changes in management activities in response to five stressors of climate change: drought, flooding, intense storms, seasonal shifts, and extreme temperatures.

## Respondent Demographics

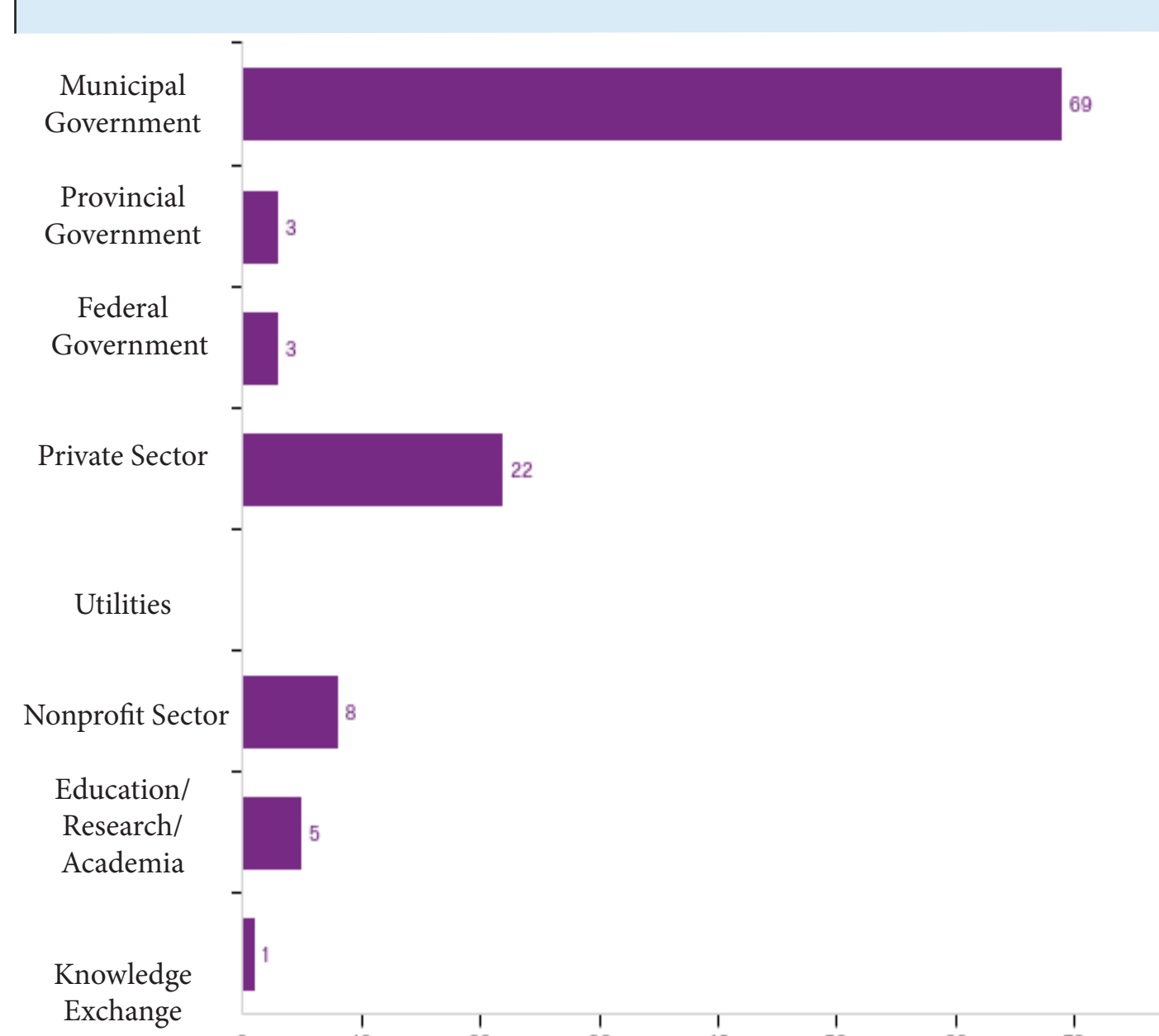


Figure 1. Sector of managed urban forest and number of respondents who work in them.

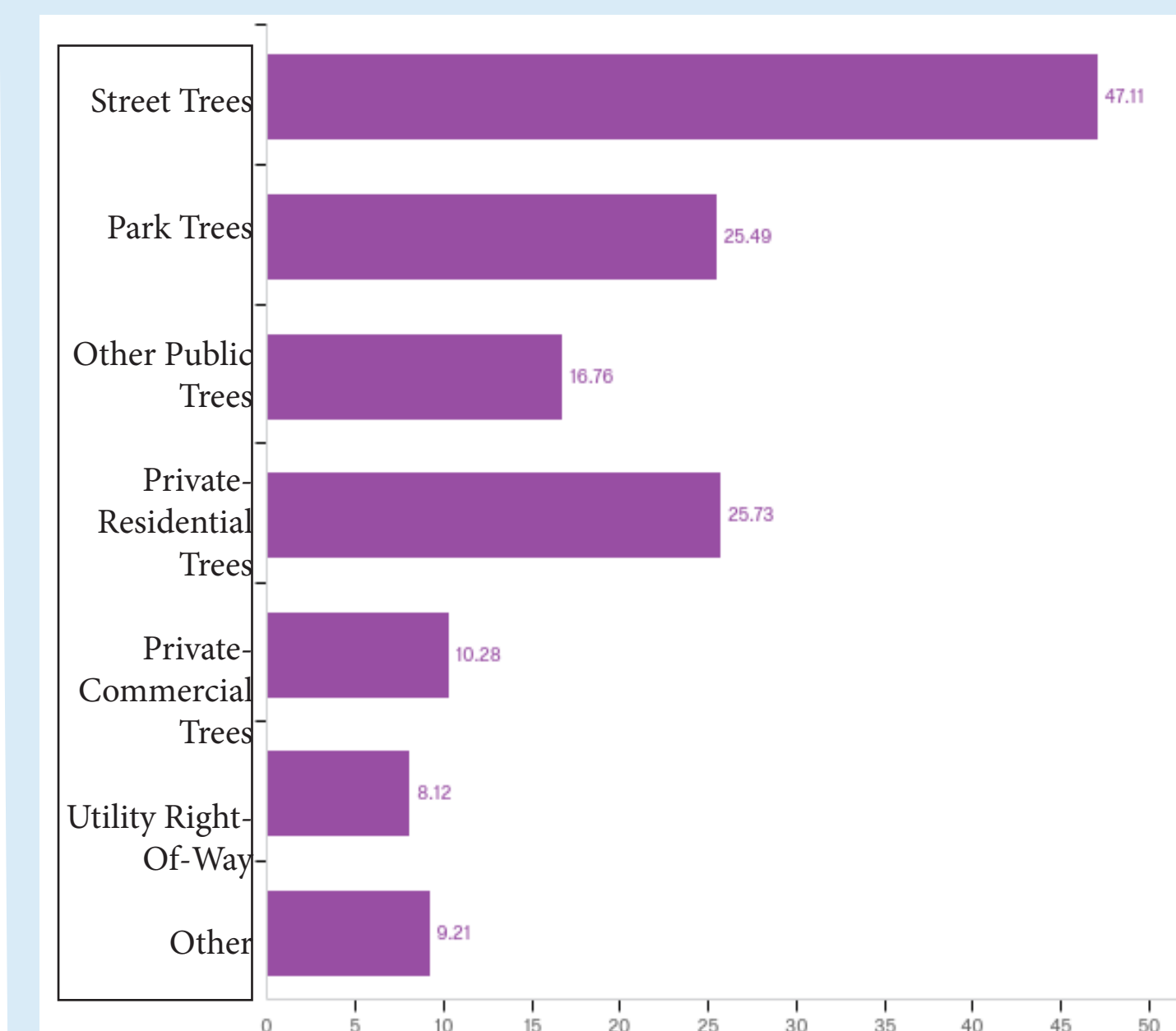


Figure 2. Average percent of trees managed on various properties by survey respondents.

## Methodology

### • Create Survey

- Challenge
  - Ask urban foresters about their response to climate change without allowing them to have bias in their answers
- Solution
  - Ask about specific management practices they might have changed in regard to five impacts of climate change
  - The five impacts asked about were drought, flooding, intense storms, extreme temperatures, and seasonal shifts
  - This allows for biases to be minimized because responding to the above symptoms could just be part of the job as an urban forester
  - The survey had to gather a significant amount of information without being too difficult or long to fill out

### • Question Sources

- Original Likert-type response questions
- Clark et al. (1997) Best management practices for a sustainable urban forest informed additional non-climate change questions [2]

### • Survey Administration

- Canadian Urban Forest Network (CANUFNET)
  - Respondents were contacted through an email list serve
  - Encouraged to forward survey to their networks
- Recruitment email sent three times over three weeks
  - Survey sent open from April 4, 2018- April 25, 2018
  - The Dillman Tailored Design Method [3]

### • Data Analysis

- Current analyses is done in R and Qualtrics

## Preliminary Results

The survey looked at how urban foresters are experiencing the major impacts of climate change and if their management activities in response changed in the past five years. For each impact of climate change, a series of agree/disagree questions were asked to examine the extent of each impact on particular urban forest practices.

These impacts include drought, flooding, intense storms, extreme temperatures, and seasonal shifts. In the following figures, “strongly agree” is on the far left and “strongly disagree” on the far right.

The series of questions here asked **“Please indicate your level of agreement with the following statements regarding how [drought/flooding/intense storms/extreme temperatures/seasonal shifts] has impacted how you manage trees in the urban forest within the past 5 years.”**

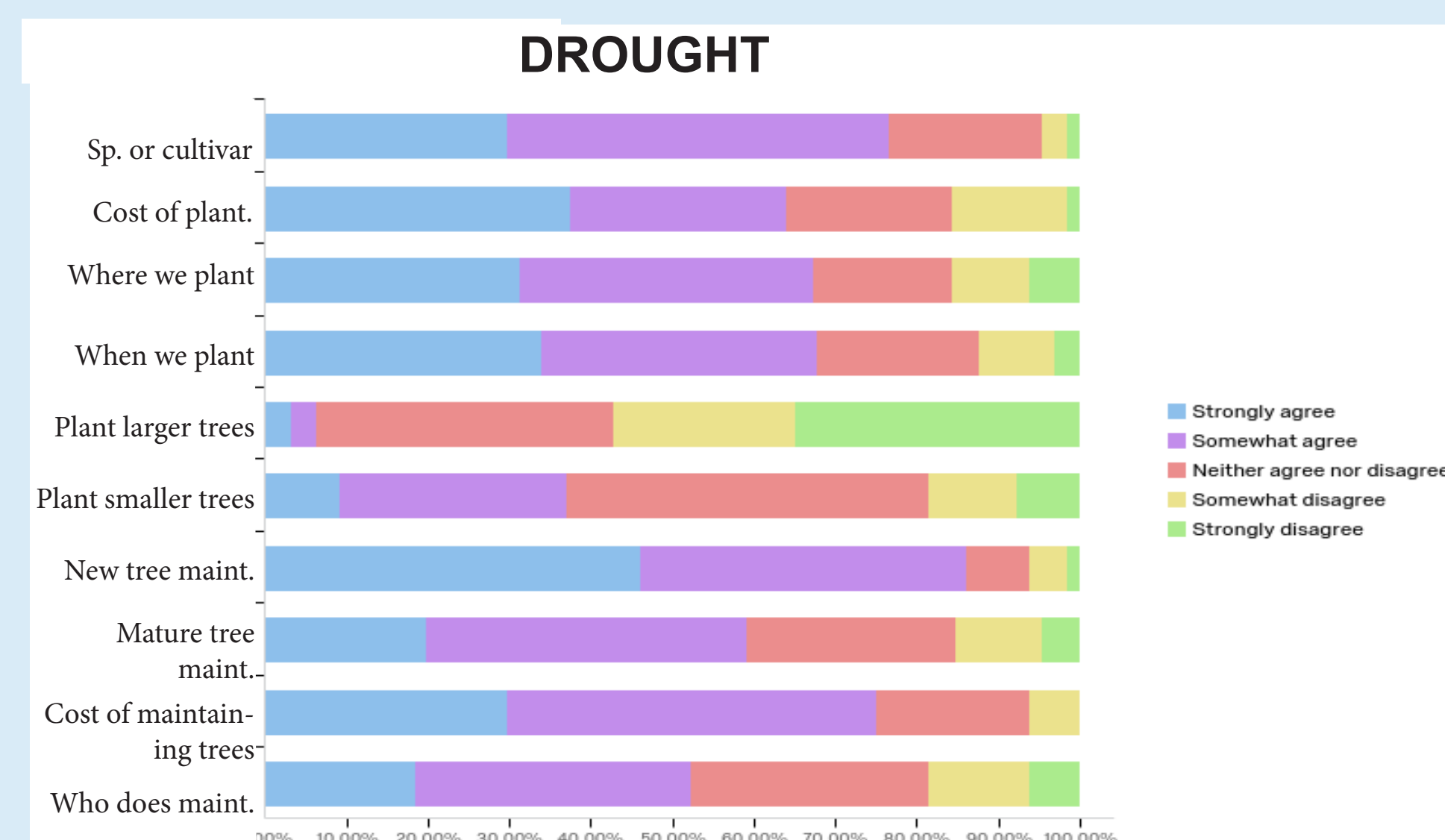


Figure 5. Various levels of agreement with how drought has affected urban forest management.

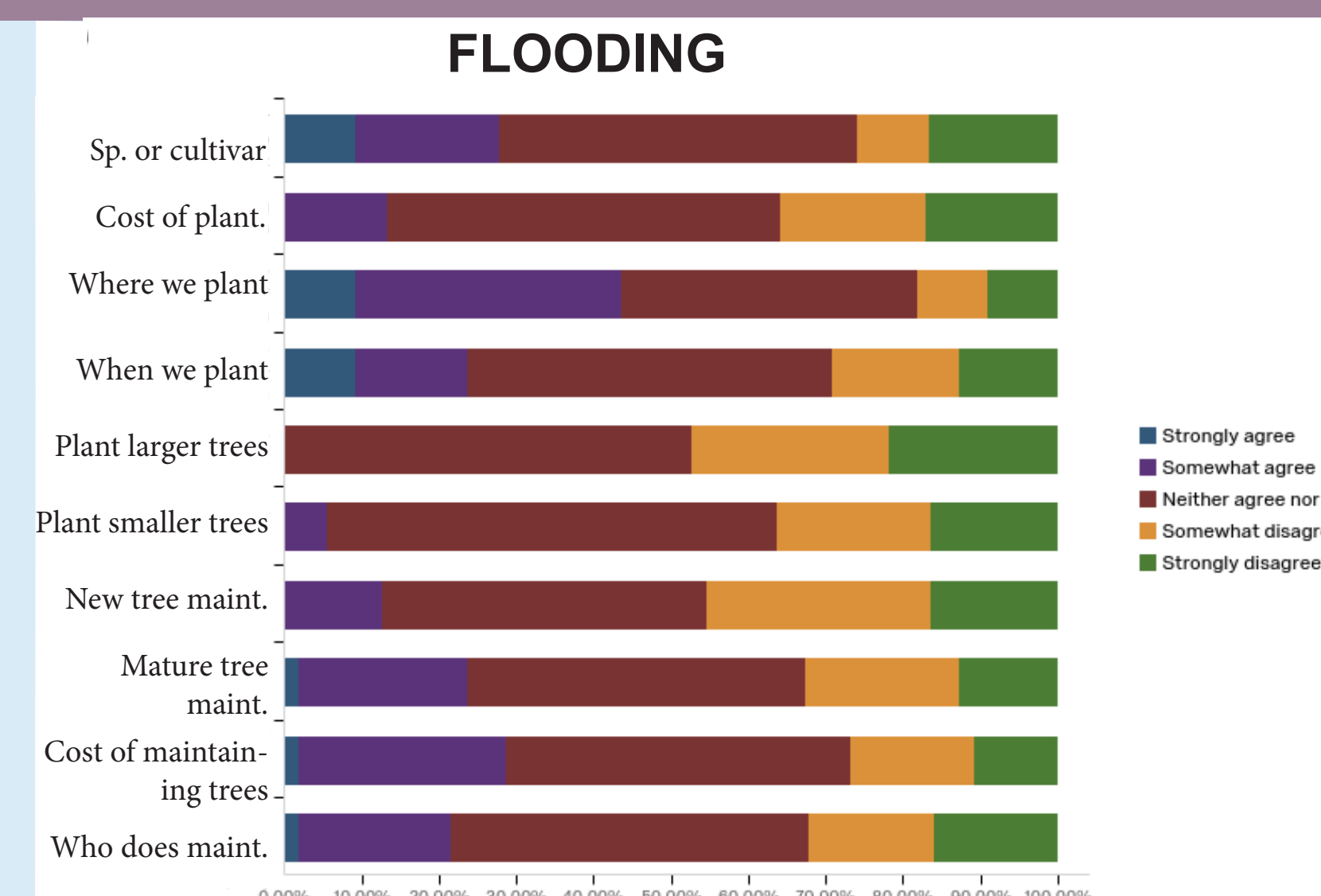


Figure 3. Various levels of agreement with how flooding has affected urban forest management.

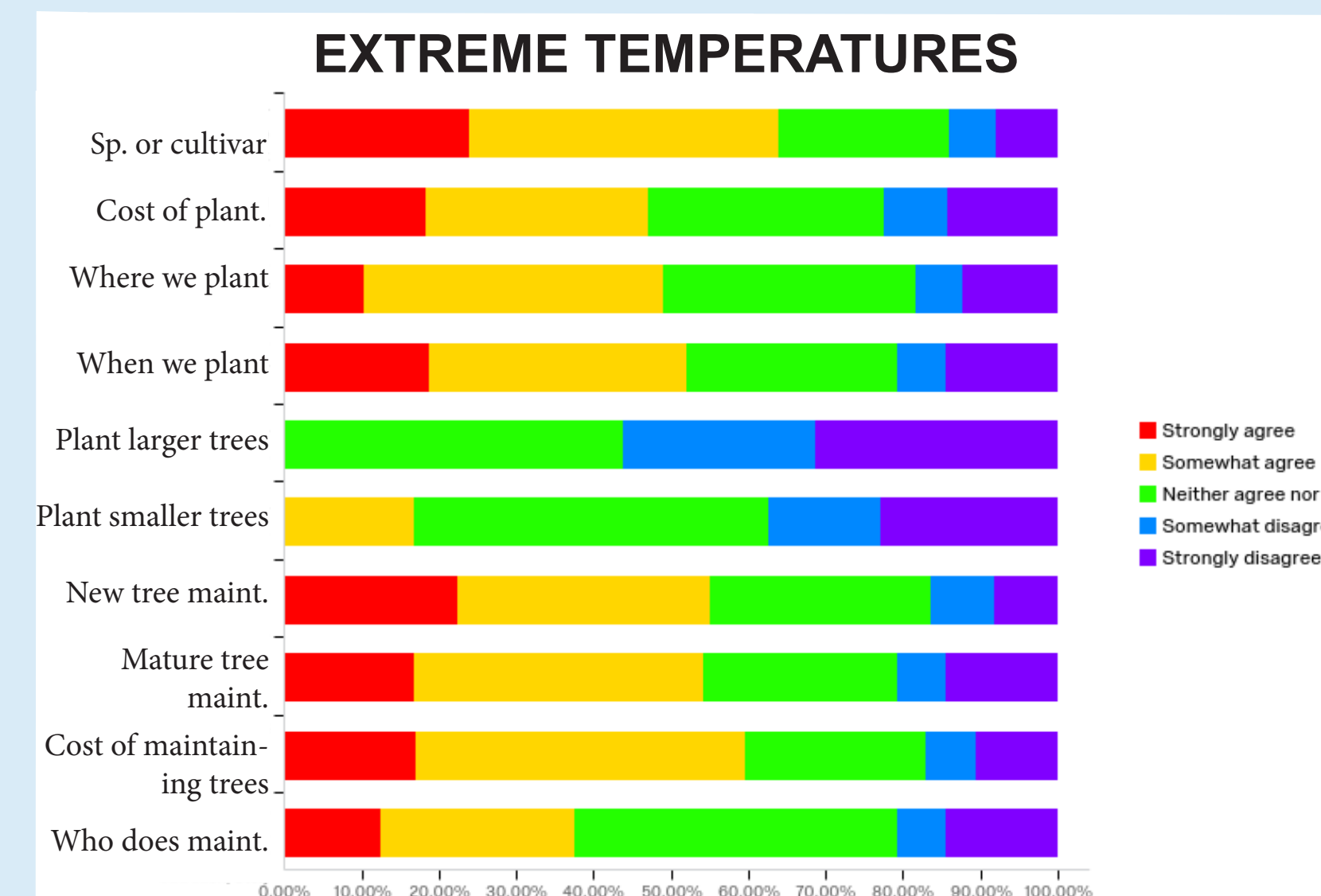


Figure 6. Various levels of agreement with how extreme temperatures have affected urban forest management.

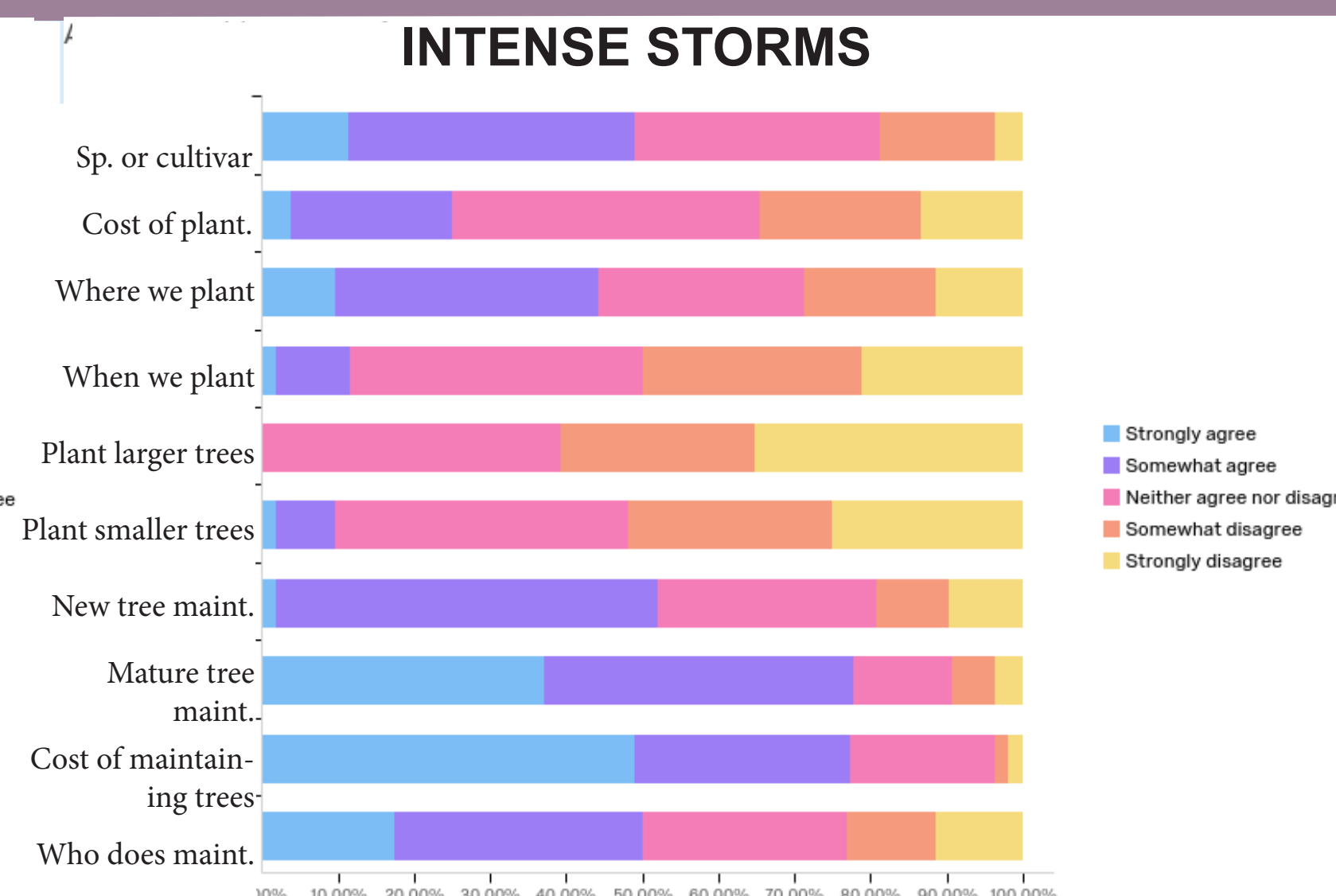


Figure 4. Various levels of agreement with how intense storms have affected urban forest management.

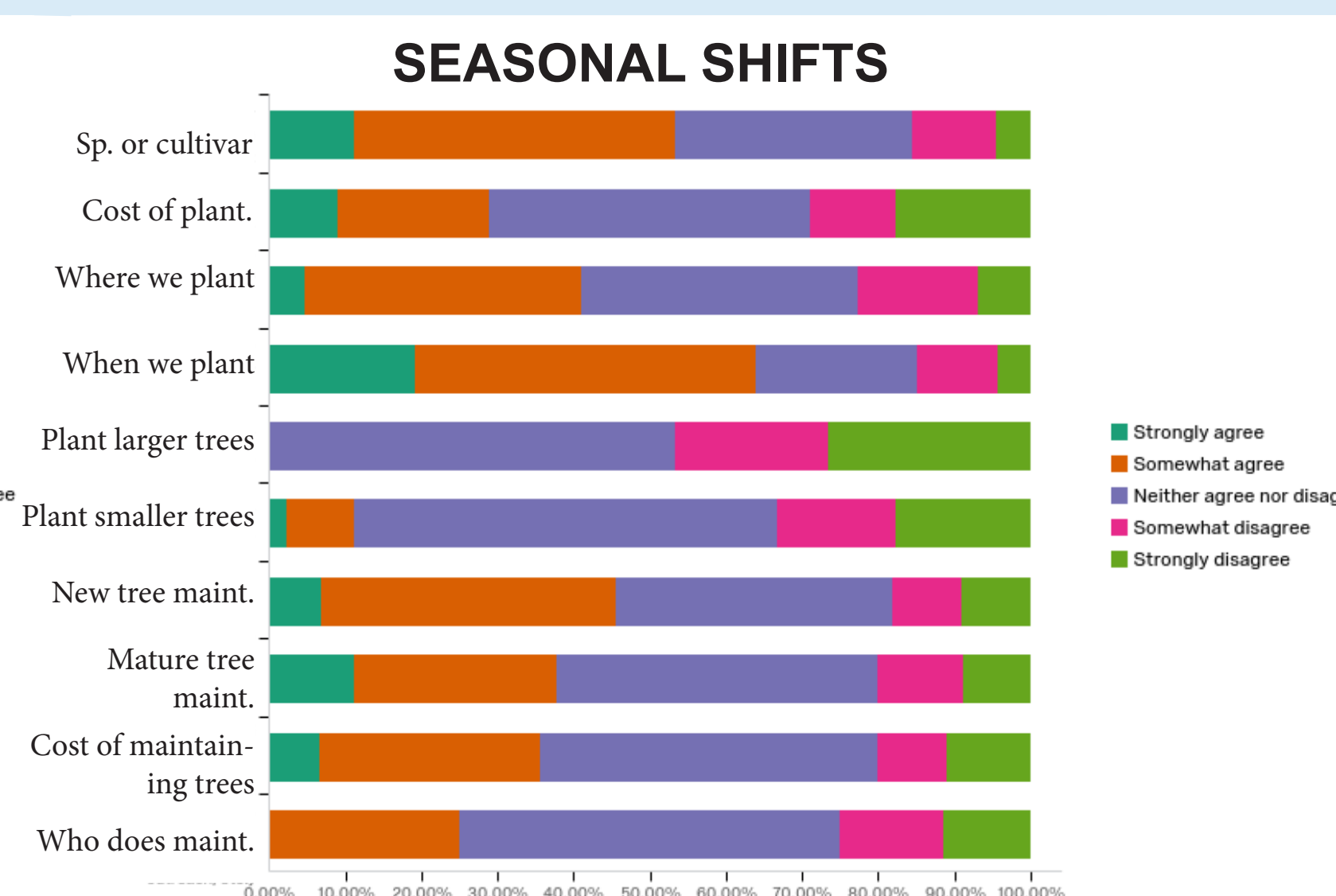


Figure 7. Various levels of agreement with how seasonal shifts have affected urban forest management.

## Next Steps

- Break down responses by respondent/program type and geography to see if different types of urban foresters are doing different things
- Comparing climate change knowledge to experience and action
- Qualitative analysis of free text input
- Develop an analysis of how knowledge and experience of climate change affect how urban foresters in Canada are changing their management activities

## References

1. Verbruggen, A., W. Moomaw, J. Nyboer, 2011: Annex I: Glossary, Acronyms, Chemical Symbols and Prefixes. In IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation [O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlomer, C. von Stechow (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
2. Clark, J. R., Matheny, N.P., Cross, G., Wake, V. (1997) A Model of Urban Forest Sustainability. Journal of Arboriculture, 23 (1), 19-29.
3. Dillman, D. A., Smyth, J. D., Christian, L. M., & Dillman, D. A. (2009). Internet, mail, and mixed-mode surveys: The tailored design method. Hoboken, N.J: Wiley & Sons.